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AUTHOR Chung, Young Hee
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ABSTRACT

A study of Karok, an American Indian language spoken in northern California, provides an argument for CV theory over moraic theory from compensatory lengthening. In a previous study, moraic theory is argued to be superior to CV phonology in accounting for compensatory lengthening; it is shown here that compensatory lengthening in Karok cannot be provided with any systematic accounting in moraic theory, while it is given a systematic account in CV theory by invoking empty C's. Phonological processes relevant to the discussion include vowel lengthening, glottal stop insertion, and mono-syllabic gemination. Analyses of these three processes are presented within the framework of CV theory, and the same processes are then considered within the framework of moraic theory. Data and generalizations are drawn from a third study. (Contains 4 references.) (MSE)

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COMPENSATORY LENGTHENING IN KAROK AND CV PHONOLOGY

Young Hee Chung
The Ohio State University

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The aim of this paper is to provide an argument for CV theory over moraic theory from compensatory lengthening in Karok. Moraic theory is argued to be superior to CV phonology in accounting for compensatory lengthening in Hayes (1988). I show in the present paper that compensatory lengthening in Karok cannot be provided with any systematic account in moraic theory, while it is given a systematic account in CV theory by invoking empty C's. Phonological processes which are relevant to the present discussion are Vowel Lengthening, Glottal Stop Insertion, and Mono-syllabic Gemination. Karok is an American Indian language spoken in Northern California. The data and generalizations are drawn from Bright (1957). In the first half of this paper, the analyses of these three processes are presented within the framework of CV theory. In the second, the same processes would be considered within the framework of moraic theory proposed by Hayes (1988).

1. Vowel Lengthening

Certain suffixes in Karok trigger vowel lengthening in the final syllable of a preceding stem, under the condition that

(i) the stem ends in a consonant and
(ii) the stem is of the class known as moving accent stems. Moving accent stems are those which do not contain the sequence VCV.
(iii) When the suffix begins with a vowel, the vowel lengthening affects only the stems which end in a geminable consonant (p, t, c, k, f, ł, s, ś, x, but not h, r, ?, y, and w[1]).

For the present discussion, I will ignore the second generalization, since it will need a detailed discussion of the accent system in this language, which is beyond the scope of the present paper. This will hopefully not affect the present discussion in any significant way. Among the suffixes conditioning vowel lengthening are the durative suffix -tih, -at `the past suffix', -i `the imperative suffix', -furuk `indoors', -rupu `downriver', -taku `on or onto a horizontal surface', and so on[2]. The examples in (1) and (2) illustrate the generalization (i) and (ii) respectively.

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(1) (a) -tih 'durative suffix'
ikwip 'to run'
ikwi:p-tih 'to be running'
but pata 'to eat acorn soup'
pata-tih 'to be eating a corn soup'

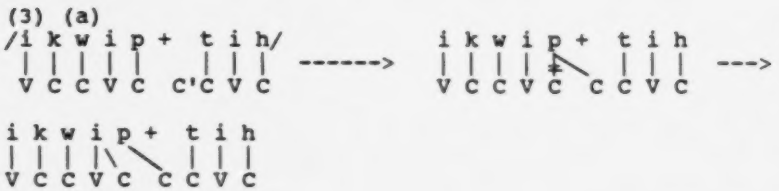
(b) -taku 'on a horizontal surface'
θiw 'to be, lie'
θi:w-taku 'to lie on'
iskak 'to jump'
iska:k-taku 'to jump onto'
but iphi 'to put'
iphi-taku 'to put onto'

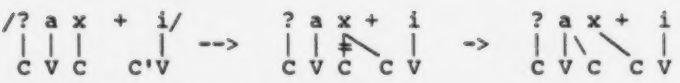
(2) (a) -i 'imperative'
?ax 'to bite'
?a:x-i 'bite him!'
ikwip 'to run'
ikwi:p-i 'run!'
but iksah 'to laugh'
iksah-i 'laugh!'
kuhi 'to be sick'
kuh-i 'be sick!'[3]

The examples in (1) involve consonant-initial suffixes, while those in (2) contain vowel-initial suffixes. The vowel-lengthening suffixes affect the last vowel of the stem only when the stem ends in a consonant as illustrated in (1). When followed by a vowel-initial suffix, not all consonant-final stems undergo vowel-lengthening; only those ending in a geminable consonant undergo it, as shown in (2).

I assume that potential vowel lengthening suffixes have an initial empty C slot. Lengthening of the vowel is the consequence of Double Flop, in which a preceding consonant shifts its association to fill the empty C slot. This process creates a new empty position which is filled by spreading of the preceding vowel melody in a double flop maneuver[4].

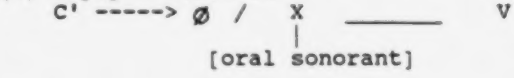
(3) (a)



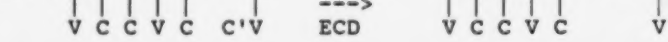


Double Flop would incorrectly lengthen the last vowel of a stem ending in a non-geminable consonant even before vowel-initial suffixes. To prevent this, I propose Empty C Deletion (henceforth, ECD), which deletes an empty C slot when it is preceded by a non-geminable consonant and followed by a vowel. In the current feature system, there is no feature or set of features available to represent non-geminable consonants as a natural class. I employ, following Bright (1957), the feature [oral sonorant] to include all non-geminable consonants and vowels.

(4) Empty C Deletion[5]



An empty C slot is deleted when followed by a vowel and preceded by an oral sonorant, either a consonant or a vowel. The choice of X slot over C slot in Empty C Deletion does not seem to affect the analysis of Vowel Lengthening. The reason for the unspecification for syllabicity of oral sonorant will be clear as we proceed to the discussion of later sections. The derivation of the example in (2.b) is shown below.



There is no empty C slot available for the application of Double Flop after Empty C Deletion applied, and so no vowel-lenthening. A crucial point here is that Empty C Deletion also allows enlightening accounts of other phonological processes in this language. I will discuss two of those phonological processes. One is Glottal Stop Insertion of Vowel-Initial Stems, and the other is Gemination of Mono-Syllabic Stems.

2. Glottal Stop Insertion of Vowel-Initial Stems

Vowel-initial stems in Karok have an allomorph with an initial [?] when preceded by either a juncture (that is, it is not preceded by any segment) or a geminable consonant. (To be exact, preceded by a polysyllabic partner ending in a geminable consonant. I ignore the polysyllabicity condition in the present discussion.) They remain vowel-initial when preceded by a non-

geminable consonant. When preceded by a vowel, either vowel contraction or vowel deletion takes place.

(6) (a) mukun- `his'
impa:h `child'
mukun?impa:h `his child'

(b) ?impah `child!'
?apmar `mouth!'

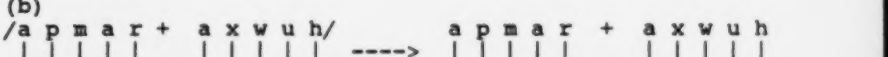
(c) apmar `mouth'
axwuh `fuzz'
apmaraxwuh `whiskers'

(d) i. ?amwa- `salmon'
iwaxraha `dry'
?amwe:waxraha `dry salmon'
ii. nani- 'my'
apsi:h 'leg'
nanipsi:h `my leg'

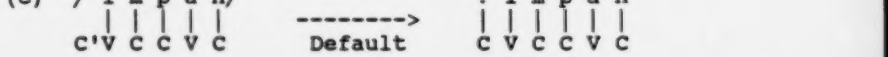
The examples in (6.a) and (6.b) involve vowel-initial stems preceded by a geminable consonant and by a juncture respectively. Those in (6.c) contain vowel-initial stems preceded by a non-geminable consonant. The examples in (6.d) involve stems preceded by a vowel, a brief discussion of which will appear later in this section. To account for the alternant form with an initial [?], I assume that all stems in Karok begin with C; thus, vowel-initial stems have an underlying initial empty C. The allomorph with an initial [?] is the realization of the empty C by default rules. The empty C is deleted between an oral sonorant and a vowel by Empty C Deletion. This explains why vowel-initial stems have an initial [?] only when preceded by either a geminable consonant or juncture.

(7) (a)

(b)



(c)



In (7.b) the empty C is deleted because it is preceded by [r], an oral sonorant and is followed by a vowel. At this point one might wonder why in (7.a) Double Flop does not apply to lengthen the vowel in the prefix, even

though it satisfies the structural description of the rule. A crucial fact to note is that Vowel Lengthening occurs only between stems and suffixes in this language; it never occurs between prefixes and stems. I assume this is a consequence of the fact that suffixation and prefixation occur at different strata, and the domain of Double Flop is the stratum where suffixation occurs. (7.a) involves prefixation, which occurs at a stratum which is not the domain of Double Flop. This explains the failure of Vowel Lengthening in this case. Empty C Deletion, in contrast, applies at both strata.

Now, let us turn to the cases where a vowel-initial stem is preceded by a vowel. When a vowel-initial stem follows /a/, vowel contraction occurs as in (6.di); when it follows any other vowel, the stem's initial vowel is lost as seen above in (6.dii). Stem-initial empty C's in these cases are required to be deleted, since it is highly unlikely that vowel contraction and vowel deletion occur across an intervening C slot. Empty C Deletion, where an oral sonorant is unspecified for syllabicity, will delete stem-initial empty C's between vowels as well as between a non-geminable consonant and a vowel, so that vowel contraction and deletion would take place freely.

Empty C Deletion, as seen so far, allows an enlightening account of Glottal Stop Insertion, thus is independently supported.

3. Gemination of Monosyllabic Stems

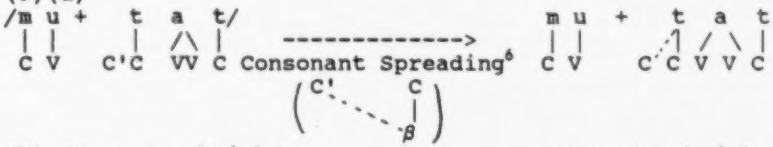
In this section, I show how Empty C Deletion correctly accounts for the process of gemination of mono-syllabic stems. All we need in order to account for this process is to assume that Empty C Deletion is a mirror image rule. Mono-syllabic stems which begin with a geminable consonant have an allomorph with an initial geminate intervocalically. The stems which begin with a non-geminable consonant, in contrast, does not have such an allomorph.

(8)	(a) mu-	`his'		?amwa-	`salmon'	
	ta:t	`mother'		ma:n	`skin'	
	mutta:t	`his mother'		mutta:t	`salmon skin'	
but	(b) mukun-	`their'		wa-	`its'	
	ta:t	`mother'		hih	`language'	
	mukunta:t	`their mother'		wahih	`its language'	

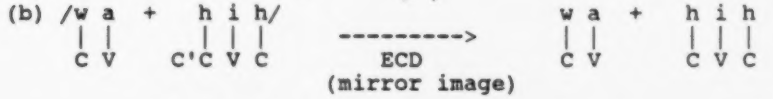
The examples in (8.a) involve mono-syllabic stems which begin with a geminable consonant, while those in (8.b) contain stems which begin with a non-gemnable consonant. Note that the stems are all preceded by a vowel. There might be more than one possible analysis of this

gemination process. In the analysis which I adopt here, all mono-syllabic stems are assumed to have an empty C initially, specified underlyingly or by a rule. Gemination of the initial consonant is a consequence of spreading the initial consonant to the empty C, resulting in a geminate. The empty C of the stems which begin with a non-geminable consonant, however, is deleted by Empty C Deletion, since it occurs between a vowel and an oral sonorant as is illustrated in (9.b). This explains why monosyllabic stems which begin with a non-geminable consonant do not have a geminate when preceded by a vowel.

(9)(a)

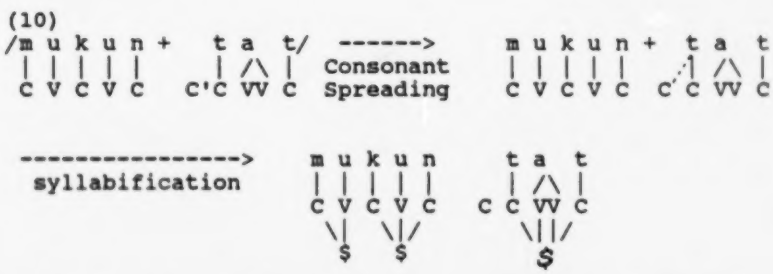


(b)



Lastly, the fact that the gemination occurs only intervocalically is a natural consequence of a syllabification which does not allow consonant clusters either in the onset or the coda. Because of this restriction, an empty C, which is filled by spreading of a following consonant, is extrasyllabic when preceded by a consonant as is shown in (10). Unsyllabified consonants are not realized on the surfac, explaining why mono-syllabic stems do not have a geminate when preceded by a consonant.

(10)



Empty C Deletion also allows a systematic account of Consonant Gemination, thus is independently supported.

4. Moraic Theory

In this section, I will examine the three processes in Karok from the moraic point of view, and show that Vowell Lengthening is not readily provided with any convincing account within moraic theory, while the other two could possibly be given accounts.

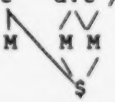
First, let us consider Glottal Stop Insertion. This process could be accounted for by positing a fully underspecified segment stem-initially as in (11).

(11) impa:h 'child'

The allomorph with an initial glottal stop could be the realization of this underspecified segment by default rules. The underspecified segment is deleted by a rule which deletes it between an oral sonorant and a vowel. This explains why vowel-initial stems have an initial [?] only when preceded by a geminable consonant.

Secondly, Gemination of Mono-Syllabic Stems could be accounted for if such stems are assumed to have a stray mora which occurs extrasyllabically as in (12).

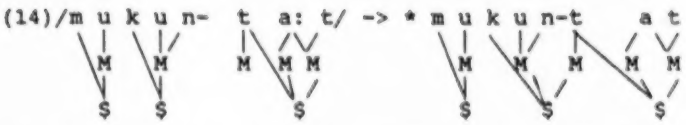
(12)[7] /t a:t /



When preceded by a vowel, the extrasyllabic mora spreads to a preceding syllable, resulting in a geminate as shown in (13). When preceded by a consonant however, the extrasyllabic mora does not spread: otherwise, we would end up with an ill-formed syllable structure as is illustrated in (14)[8]. Unsyllabified moras are not realized phonetically. This explains why mono-syllabic stems have a geminate only when preceded by a vowel.

(13) /m u - t a: t/ -------> m u- t a: t

(14)/m u k u n- t a: t/ -> * m u k u n-t a t



Not all mono-syllabic stems, as we know, have a geminate when preceded by a vowel though; only those which begin with a geminable consonant have it. To predict this fact correctly, a restriction would be postulated underlyingly so that only geminable consonants are linked to a stray mora underlyingly.

Lastly, Vowel Lengthening is considered. The suffixes which trigger vowel lengthening could be assumed to have an extra-syllabic mora as is illustrated in (15).

(15) /-t i h/ 'durative suffix'

In order to get the lengthening of the final vowel of the stem before these suffixes, adhoc stipulations are required. First, in order to syllabify an extrasyllabic mora to a preceding syllable, the stem-final consonant needs to be desyllabified first; otherwise, it would result in an ill-formed syllable structure. Secondly, the extra-syllabic mora needs to be delinked from any segment so that a preceding vowel can spread to it, resulting in a lengthened vowel. The spreading, however, needs to be constrained so that only the vowel of stems which end in a consonant can spread. Such a constraint is unmotivated, and so is not a desirable solution. An alternative would be to assume that the vowel-lengthening suffixes have an initial empty mora, which is a moraic counterpart of empty C's or V's in CV theory. This analysis faces a similar problem as the first analysis: that is, the dependency of vowel-lengthening on the stem-final consonant is hard to explain in a natural way.

5. Conclusion

Moraic theory was argued by Hayes (1988) to be extremely successful and so superior to CV theory in accounting for compensatory lengthening. In this paper, I have argued that it is not always the case by showing that a compensatory lengthening process in Karok, namely Vowel Lengthening is not readily provided with any systematic account, while it can be analysed systematically within CV theory.

FOOTNOTES

1. In Bright(1957), the symbol [v] is used for this sound. He includes this sound under sonorants even though it is described as unrounded bilabial spirant. The fact that this sound alternates with [m] in several morphophonemic processes strongly suggests a more sonorant quality of this sound than a spirant. I assume, therefore, that this sound is bilabial glide [w].

2. There seem to be around fifteen vowel-lengthening suffixes out of over sixty or seventy suffixes.

3. Vowel deletion is involved here.

4. Double Flop has been proposed first by Steriade(1982) for the description of Ancient Greek.

5. The use of X in this rule could undermine the argument for CV theory. The aim of the present paper, however, could be considered to compare moraic theory with "segmental theories" of prosodic elements such as CV theory and X theory with respect to a commpensatory lengthening process in Karok.

6. Consonant Sprading applies only between prefixes and stems, but not between stems and suffixes. It suggests that its domain is the stratum where prefixation occurs; the stratum where suffixation occurs is not its domain.

7.This configuration has been proposed by Hayes (1987) as one of the possible representations for syllable initial geminates.

8. A syllable where two moras are intervened by a consonant is ill-formed in any language.

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